

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Flexibility for Delivery of Communications by)	IB Docket No. 01-185
Mobile Satellite Service Providers in the 2 GHz)	
Band, the L-Band, and the 1.6/2.4 GHz Band)	
)	
Amendment of Section 2.106 of the)	ET Docket No. 95-18
Commission's Rules to Allocate Spectrum at)	
2 GHz for Use by the Mobile Satellite Service)	

**FURTHER COMMENTS OF
CONSTELLATION COMMUNICATIONS HOLDINGS, INC.**

Constellation Communications Holdings, Inc. ("Constellation") submits this filing in response to the Commission's March 6, 2002 Public Notice¹ requesting additional comments in the above captioned proceeding.²

Constellation is a current MSS licensee, holding licenses in the 1.6/2.4 GHz and the 2 GHz MSS bands.³ As an MSS licensee, the decisions adopted by the Commission in this proceeding will significantly enhance the capabilities of Constellation's as well as other licensees' 1.6/2.4 GHz and 2 GHz MSS systems. Constellation submitted Comments and Reply

¹ See "Commission Staff Invites Technical Comments on the Certain Proposals to Permit Flexibility in the Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz, L-Band and the 1.6/2.4 GHz Bands," FCC Public Notice, DA 02-554, March 6, 2002.

² On August 17, 2001, the Commission issued a Notice of Proposed Rulemaking proposing rules to authorize Mobile Satellite Service ("MSS") operations to conduct ancillary terrestrial operations in the 1.6/2.4 GHz and 2 GHz bands. See Notice of Proposed Rulemaking in IB Docket No. 01-185, FCC 01-225, released August 17, 2001. ("Notice")

³ See Notice at paras. 9 and 21. In these Comments, Constellation uses the notation "L-Band" to denote the 1525-1559 MHz and 1626.5-1660.5 MHz bands, "1.6/2.4 GHz" or "Big LEO" to denote the 1610-1626.5 MHz and 2483.5-2500 MHz bands, and "2 GHz" to denote the 1990-2025 MHz and 2165-2200 MHz bands.

Comments in this proceeding and welcomes this opportunity to provide these additional comments.⁴

The Commission in its March 6, 2002, Public Notice requested comments on the viability of severing the MSS and terrestrial operations in the bands under examination in this proceeding. Specifically, the Commission wants to know if it is technically feasible for one operator to provide terrestrial service and another operator to provide satellite service in the same MSS band. The Public Notice further asks for a response to a series of questions that presume that terrestrial and satellite operations can be severed. As discussed below and in its previous comments in this proceeding, Constellation does not believe it is technically feasible to separately license terrestrial and satellite operators in the MSS bands.

I. It is Not Feasible to Separately License Satellite and Terrestrial Operations in the MSS Bands

Constellation previously demonstrated that it is not technically feasible for separately licensed terrestrial and satellite licensees to provide an integrated MSS Ancillary Terrestrial Component (“ATC”) service to subscribers as a practical matter.⁵ Terrestrial air interface standards, user terminal radio characteristics, resource management algorithms, and subscriber databases and billing systems have to be adapted to include a satellite component. Furthermore, terrestrial mobile radio system licensees have no incentive to make the necessary modifications to these systems, or to integrate their terrestrial business operations with a satellite operator, in order to provide an integrated MSS ATC service. Any forced business or operational combination of a terrestrial operator with an MSS licensee is unworkable since terrestrial

⁴ Constellation submitted its comments in this proceeding on Oct. 22, 2001 (“Constellation Comments”) and Reply Comments on November 13, 2001 (“Constellation Reply Comments”).

⁵ See Constellation Comments at 16-22 and Reply Comments at 4-8.

operators view MSS licensees as direct competitors for spectrum access. Consequently, any terrestrial systems licensed in MSS bands to non-MSS system licensees will be operated as independent systems with no satellite component.

Licensing of terrestrial systems to non-MSS licensees in a band allocated to MSS will therefore require a sub-allocation of the MSS band between terrestrial and satellite services. Co-channel operation of independently licensed terrestrial and satellite systems within the same geographical area will result in harmful interference.⁶ Some form of geographical exclusion zones will be required between the MSS and terrestrial service areas to avoid harmful interference if the same frequencies are to be licensed to independently operated satellite and terrestrial facilities.⁷ The specific parameters of such exclusion zones will depend on whether the MSS uplink and downlink bands are used by terrestrial base stations and/or mobile terminals, and on their specific radio transmission characteristics. The alternative to such exclusion zones is the sub-division of an MSS band into separate band segments for satellite and terrestrial licensees.

Even if geographical or frequency separation is provided between licensed MSS and independently operated terrestrial systems in an MSS band, there is an additional problem for code division multiple access (“CDMA”) satellite systems, like Constellation’s,⁸ that utilize

⁶ If an MSS uplink band is used by terrestrial mobile transmitters, co-channel MSS user terminals can cause interference to terrestrial base station receivers, and the aggregate of terrestrial user transmissions may cause interference at the satellite receiver. If terrestrial base stations transmit in an MSS uplink band, the interference paths will be from the base stations to the satellite receiver and from satellite mobile terminals to terrestrial mobile terminals. For an MSS downlink band, co-channel transmitting terrestrial base stations or terrestrial mobile terminals will cause interference to reception by satellite mobile terminals. The interference potential of MSS satellite downlinks to terrestrial systems will depend on whether the MSS system is governed by a power flux density limit.

⁷ For example, such a geographical separation concept could preserve the option of MSS satellite systems serving remote and rural areas not covered by terrestrial networks.

⁸ See Applications of Constellation for its 1.6/2.4 GHz and 2 GHz MSS systems for a description of its CDMA operations.

frequency changing transponders to simply amplify and frequency translate signals. In order to control the complexity, weight and cost of a constellation of LEO satellites, the bandwidth of such transponders are designed to match the MSS allocation. Such frequency changing transponders receive and amplify all signals seen by the satellite receiver within its design bandwidth, including signals from terrestrial stations operated by other licensees within the satellite beam. If the beam includes both MSS and terrestrial licensed service areas, the aggregate level of co-frequency terrestrial mobile users or base stations within an MSS receiving beam can result in harmful interference at the satellite receiver. However, even if the terrestrial transmitters are not co-frequency with the satellite signals in the transponder, such terrestrial operations in MSS bands can severely degrade satellite system performance by wasting the limited power available in a satellite transponder and reducing the MSS system capacity.⁹

One of the key inter-system coordination criteria for CDMA MSS systems, like the 1.6/2.4 GHz and 2 GHz MSS systems licensed to Constellation, is an areal EIRP density limit to govern the aggregate power radiated by users within a specified area on the earth's surface. For inter-system coordination between MSS licensees, these limits would be averaged over areas corresponding to satellite beam areas on the earth's surface. In an integrated MSS ATC system, the single system operator can manage the assignment of powers and frequencies for satellite and terrestrial links within a satellite beam coverage area to maximize the total amount of service offered to subscribers while complying with an areal EIRP density limit. Moreover, polarization discrimination factors are likely to be higher for the opposite senses of circular polarizations used

⁹ Satellite transponders used for CDMA transmissions are designed to operate in a linear mode. This means that all signals presented to a satellite transponder are amplified to the same extent, and the total available transponder power is distributed proportionately among all the signals in the transponder, whether the signals are desired or not. Unlike terrestrial repeaters, satellite transponder power is very limited and therefore very expensive to waste on repeating undesired signals.

by MSS systems operating in the same band than the discrimination factor between circular and linear polarizations between an MSS system and an independent terrestrial systems operating in the same band. These factors provide significant flexibility to integrated MSS ATC satellite operators to optimize frequency and power assignments within its system to control interference and average peak “hot spot” traffic in a limited area over the larger satellite beam area involved in inter-system coordination.

However, if independently operated terrestrial facilities are licensed in MSS bands, protection of MSS satellite transponders would require an areal EIRP density limit that is averaged over areas covering a relatively small number of cells to ensure uniformity across the entire country. This is because a satellite beam is likely to cover the service areas assigned to different terrestrial licensees that operate their systems independently of each other, and who therefore can not average their individual operations to achieve compliance over a larger area corresponding to a satellite beam. As a result, independently operated terrestrial systems will have less flexibility to average “hot spot” traffic areas with lower traffic areas to comply with an areal EIRP density limit than integrated MSS ATC systems operated by the current MSS licensees.

Finally, sub-allocation of the current MSS bands is likely to result in an insufficient amount of spectrum being available for economically viable satellite or terrestrial systems. Constellation is particularly concerned that reducing the amount of spectrum available to MSS systems will prevent it from implementing advanced third generation (“3G”) wireless services using wideband code division multiple access (“WCDMA”) based on 2.5 or 5 MHz bandwidth radio frequency carriers.¹⁰ For this reason, Constellation believes that the Big LEO bands at

¹⁰ Constellation plans to utilize CDMA techniques in both its 1.6/2.4 GHz and its 2 GHz systems licensed by the Commission.

1.6/2.4 GHz are too narrow to be sub-allocated between satellite and terrestrial licensees and still support the 3G air interface standards. Moreover, re-allocating 2 GHz MSS spectrum to separate terrestrial users, rather than reassigning this spectrum among MSS licensees from MSS licensees who do not implement their systems, will greatly impair the ability of MSS licensees to successfully finance their systems.

Limiting terrestrial operations in MSS bands to integrated MSS ATC licensees will result in more efficient spectrum utilization. Only integrated MSS ATC licensees have the ability to average interfering over large satellite beam areas to control interference. Only MSS ATC licensees have the flexibility to optimize the assignment of frequencies between terrestrial and satellite transmissions and between rural and urban subscribers to maximize the total amount of service offered to subscribers within the allocated MSS bands. These capabilities of integrated MSS ATC systems provide a unique opportunity to provide advanced wireless services on a nationwide basis to both urban and remote/rural areas in a spectrum efficient and financially viable manner.

II. Response to Specific Commission Questions That Presume That Terrestrial and Satellite Operations Can Be Severed

The Commission raises a second set of issues based on the assumption that terrestrial and satellite operations can be severed. While the severance of satellite and terrestrial operations in MSS bands is neither spectrum efficient nor desirable, Constellation provides the following responses to these issues posed by the Commission.

- A. How would severing the operations affect domestic and foreign satellite operations? terrestrial operations?

In order to permit terrestrial and satellite systems to operate independently in an MSS band, the Commission would have to re-allocate a portion of the MSS band to terrestrial use.

Any sharing of frequencies by terrestrial and satellite licensees on a geographic basis would require a complex set of sharing criteria and exclusion areas where neither type of system could provide service. Moreover, areal EIRP density limits will have to be imposed on terrestrial systems operating in the United States to protect MSS systems, whether domestic or foreign, which utilize frequency changing. Such difficulties are not encountered as long as ATC operations are limited to the satellite licensees. This is because an integrated MSS ATC operator can coordinate its space and terrestrial operations with other domestic and foreign satellite operators in a single coordination venue since it controls all transmissions and thus the aggregate power levels produced by all transmitters in its system. If independent terrestrial operations were licensed, restrictive power limits would have to be imposed uniformly on all such terrestrial operations to protect foreign satellite operations since it would be impractical for a satellite operator to coordinate with hundreds of terrestrial operators or to expect independent terrestrial operators to average areal EIRP density limits across different terrestrial systems. Moreover, any transfer of allocated MSS spectrum to non-MSS terrestrial licensees in the United States would impose unfair burdens on domestic MSS licensees by reducing the amount of spectrum available to accommodate foreign MSS systems seeking to serve the United States under WTO/DISCO II provisions.

B. How would severing the operations affect service to remote and rural areas? to urban areas?

Integrated MSS ATC systems offer the best opportunity to provide advanced wireless services to remote and rural areas. If existing terrestrial system operators have not yet extended their systems to provide the level of service required in currently underserved areas, it is highly unlikely that the limited amount of spectrum that can be sub-allocated in MSS bands provide any greater incentive than is already provided by the much larger terrestrial allocations in other

portions of the spectrum. On the other hand, allowing MSS licensees to operate integrated MSS ATC facilities enables them to maximize service throughout the country, including remote and rural areas, by optimizing their mix of terrestrial and satellite links over all of the urban or rural areas included in their coverage area. Moreover, the areal EIRP density limitations on terrestrial systems in MSS bands are likely to restrict the capacity in large terrestrial cells in rural areas where the longer distances between subscribers and cell sites require higher transmit powers.

- C. How would the technical requirements for separate services differ from the technical requirements for integrated MSS ATC?

The licensing of independently operated terrestrial systems in MSS bands would require the establishment of a complex set of sharing criteria to define the interface between the two services. Coordination would not be practical between each MSS licensee and potentially hundreds of different terrestrial licensees. Instead, it will be necessary to develop a new, complex set of sharing criteria and regulations that would be specified in terms of exclusion zones, guardbands, transmit power and height limits, and areal EIRP density limits. On the other hand, current coordination procedures between MSS system operators can be readily extended to include ancillary terrestrial operations as part of an integrated MSS ATC system. The ability of integrated MSS ATC operators to average areal EIRP density levels over the large beam areas would provide more flexibility to maximize service to subscribers by optimizing assignment of calls to satellite or terrestrial signal paths within the overall power limits.

- D. How would severing the operations affect adjacent channel operations (both satellite and terrestrial)?

If only integrated MSS ATC systems were licensed in the MSS bands, adjacent channel operations would be coordinated by the MSS licensees themselves under the procedures currently specified by the Commission. With the addition of out-of-band emission limitations on

base station transmissions in MSS bands,¹¹ existing Commission rules and regulations will continue to govern the protection of the other services in bands adjacent to the MSS allocations. If terrestrial operations were licensed separately in the MSS bands, a new set of additional adjacent channel criteria (in terms of powers, guardbands, etc.) would have to be developed and specified in the Commission's rules to regulate this new interface within the MSS band. Coordination of adjacent channel operations would not be practical between an MSS system providing national coverage and hundreds of independent terrestrial operators.

- E. What requirements are necessary for an integrated MSS ATC system to avoid adjacent channel and/or adjacent band interference?

Adjacent channel interference between integrated MSS ATC systems can be handled within the current inter-system coordination procedures. Adjacent band requirements can be readily established in the service rules for integrated MSS ATC systems already being considered in this proceeding. Constellation has already addressed this matter in previously filed comments.¹²

- F. How do the technical requirements that integrated MSS ATC systems must observe to avoid creating harmful interference differ from those that freestanding terrestrial mobile systems would have to observe?

The technical requirements required to prevent harmful interference by the terrestrial component of integrated MSS ATC systems licensed to the MSS operators are similar to those that would be required for freestanding terrestrial facilities. However, integrated MSS ATC systems can develop and implement them in the context of the current inter-system coordination requirements among the MSS licensees, with only the additional specification of out-of-band

¹¹ In the event an integrated MSS ATC licensee decides to use an MSS downlink band for transmissions from mobile terminals to base stations, out-of-band limits will also have to be specified for these operations.

¹² See Constellation Comments at 35-37.

emission limitations on terrestrial base stations in MSS bands, and possibly mobile transmitters in MSS downlink bands, required in the Commission's rules. Since independent terrestrial operations within the MSS bands would likely be too numerous and diverse to coordinate with MSS systems, additional technical regulations would have to be established to prevent harmful interference between terrestrial systems and between terrestrial systems and MSS systems. Specific values for these regulations will have to be developed in further proceedings based on the characteristics of the planned MSS systems and whether a particular MSS band is being used for terrestrial base stations or mobile terminals. Relatively large guardbands may be required in some cases, for example if independently licensed terrestrial base stations were operated in an MSS downlink band to protect MSS subscriber receiving terminals. In addition, areal EIRP density limits would be required on each terrestrial system to limit the loading of MSS transponders by the aggregate power radiated by all of the independently operated terrestrial systems within an area corresponding to an MSS satellite beam.

III. CONCLUSION

For the reasons discussed above, Constellation once again urges the Commission to adopt rules that will allow ancillary terrestrial operations by MSS licensees in the MSS bands.

Respectfully submitted,

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March 15, 2002

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CERTIFICATE OF SERVICE

I, Patricia A. Gibson, hereby certify that a copy of the foregoing **Further Comments of Constellation Communications Holdings, Inc.**, was mailed this 15th day of March, 2002, via the United States Postal Service, first class, postage pre-paid, to each of the following:

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